



03495206
SEQUENCE LISTING

<110> BOURSAUX-EUDE, CAROLINE
GUISO-MACLOUF, NICOLE

<120> POLYPEPTIDES CONTAINING POLYMORPHISMS OF THE REPEATED
REGIONS OF PERTACTIN IN BORDETELLA PERTUSSIS,
BORDETELLA PARAPERTUSSIS, AND BORDETELLA
BRONCHISEPTICA, THEIR USE IN DIAGNOSTICS, AND IN
IMMUNOGENIC COMPOSITIONS

<130> 03495-0206-00000

<140> 09/855,754

<141> 2001-05-16

<150> 60/206,969

<151> 2000-05-25

<160> 24

<170> PatentIn Ver. 2.1

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<213> Bordetella bronchiseptica

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<213> Bordetella pertussis

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785					790					795					800
Ala	Ala	Asn	Gly	Leu	Arg	Val	Arg	Asp	Glu	Gly	Gly	Ser	Ser	Val	Leu
				805					810					815	

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Gly Arg Leu Gly Leu Glu Val Gly Lys Arg Ile Glu Leu Ala Gly Gly
 820 825 830
 Arg Gln Val Gln Pro Tyr Ile Lys Ala Ser Val Leu Gln Glu Phe Asp
 835 840 845
 Gly Ala Gly Thr Val Arg Thr Asn Gly Ile Ala His Arg Thr Glu Leu
 850 855 860
 Arg Gly Thr Arg Ala Glu Leu Gly Leu Gly Met Ala Ala Ala Leu Gly
 865 870 875 880
 Arg Gly His Ser Leu Tyr Ala Ser Tyr Glu Tyr Ser Lys Gly Pro Lys
 885 890 895
 Leu Ala Met Pro Trp Thr Phe His Ala Gly Tyr Arg Tyr Ser Trp
 900 905 910

<210> 5
 <211> 910
 <212> PRT
 <213> Bordetella pertussis

<400> 5
 Met Asn Met Ser Leu Ser Arg Ile Val Lys Ala Ala Pro Leu Arg Arg
 1 5 10 15
 Thr Thr Leu Ala Met Ala Leu Gly Ala Leu Gly Ala Ala Pro Ala Ala
 20 25 30
 His Ala Asp Trp Asn Asn Gln Ser Ile Val Lys Thr Gly Glu Arg Gln
 35 40 45
 His Gly Ile His Ile Gln Gly Ser Asp Pro Gly Gly Val Arg Thr Ala
 50 55 60
 Ser Gly Thr Thr Ile Lys Val Ser Gly Arg Gln Ala Gln Gly Ile Leu
 65 70 75 80
 Leu Glu Asn Pro Ala Ala Glu Leu Gln Phe Arg Asn Gly Ser Val Thr
 85 90 95
 Ser Ser Gly Gln Leu Ser Asp Asp Gly Ile Arg Arg Phe Leu Gly Thr
 100 105 110
 Val Thr Val Lys Ala Gly Lys Leu Val Ala Asp His Ala Thr Leu Ala
 115 120 125
 Asn Val Gly Asp Thr Trp Asp Asp Asp Gly Ile Ala Leu Tyr Val Ala
 130 135 140
 Gly Glu Gln Ala Gln Ala Ser Ile Ala Asp Ser Thr Leu Gln Gly Ala
 145 150 155 160
 Gly Gly Val Gln Ile Glu Arg Gly Ala Asn Val Thr Val Gln Arg Ser
 165 170 175
 Ala Ile Val Asp Gly Gly Leu His Ile Gly Ala Leu Gln Ser Leu Gln

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180					185					190					
Pro	Glu	Asp	Leu	Pro	Pro	Ser	Arg	Val	Val	Leu	Arg	Asp	Thr	Asn	Val
	195						200					205			
Thr	Ala	Val	Pro	Ala	Ser	Gly	Ala	Pro	Ala	Ala	Val	Ser	Val	Leu	Gly
	210					215					220				
Ala	Ser	Glu	Leu	Thr	Leu	Asp	Gly	Gly	His	Ile	Thr	Gly	Gly	Arg	Ala
	225					230					235				240
Ala	Gly	Val	Ala	Ala	Met	Gln	Gly	Ala	Val	Val	His	Leu	Gln	Arg	Ala
				245					250					255	
Thr	Ile	Arg	Arg	Gly	Asp	Ala	Pro	Ala	Gly	Gly	Ala	Val	Pro	Gly	Gly
			260					265					270		
Ala	Val	Pro	Gly	Gly	Ala	Val	Pro	Gly	Gly	Phe	Gly	Pro	Gly	Gly	Phe
		275					280					285			
Gly	Pro	Val	Leu	Asp	Gly	Trp	Tyr	Gly	Val	Asp	Val	Ser	Asp	Ser	Ser
	290					295					300				
Val	Glu	Leu	Ala	Gln	Ser	Ile	Val	Glu	Ala	Pro	Glu	Leu	Gly	Ala	Ala
	305					310					315				320
Ile	Arg	Val	Gly	Arg	Gly	Ala	Arg	Val	Thr	Val	Ser	Gly	Gly	Ser	Leu
				325					330					335	
Ser	Ala	Pro	His	Gly	Asn	Val	Ile	Glu	Thr	Gly	Gly	Ala	Arg	Arg	Phe
			340					345					350		
Ala	Pro	Gln	Ala	Ala	Pro	Leu	Ser	Ile	Thr	Leu	Gln	Ala	Gly	Ala	His
		355					360					365			
Ala	Gln	Gly	Lys	Ala	Leu	Leu	Tyr	Arg	Val	Leu	Pro	Glu	Pro	Val	Lys
	370					375					380				
Leu	Thr	Leu	Thr	Gly	Gly	Ala	Asp	Ala	Gln	Gly	Asp	Ile	Val	Ala	Thr
	385					390					395				400
Glu	Leu	Pro	Ser	Ile	Pro	Gly	Thr	Ser	Ile	Gly	Pro	Leu	Asp	Val	Ala
				405					410					415	
Leu	Ala	Ser	Gln	Ala	Arg	Trp	Thr	Gly	Ala	Thr	Arg	Ala	Val	Asp	Ser
			420					425					430		
Leu	Ser	Ile	Asp	Asn	Ala	Thr	Trp	Val	Met	Thr	Asp	Asn	Ser	Asn	Val
		435					440					445			
Gly	Ala	Leu	Arg	Leu	Ala	Ser	Asp	Gly	Ser	Val	Asp	Phe	Gln	Gln	Pro
	450					455					460				
Ala	Glu	Ala	Gly	Arg	Phe	Lys	Val	Leu	Thr	Val	Asn	Thr	Leu	Ala	Gly
	465					470					475				480
Ser	Gly	Leu	Phe	Arg	Met	Asn	Val	Phe	Ala	Asp	Leu	Gly	Leu	Ser	Asp
				485					490					495	

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Lys Leu Val Val Met Gln Asp Ala Ser Gly Gln His Arg Leu Trp Val
 500 505 510
 Arg Asn Ser Gly Ser Glu Pro Ala Ser Ala Asn Thr Leu Leu Leu Val
 515 520 525
 Gln Thr Pro Arg Gly Ser Ala Ala Thr Phe Thr Leu Ala Asn Lys Asp
 530 535 540
 Gly Lys Val Asp Ile Gly Thr Tyr Arg Tyr Arg Leu Ala Ala Asn Gly
 545 550 555 560
 Asn Gly Gln Trp Ser Leu Val Gly Ala Lys Ala Pro Pro Ala Pro Lys
 565 570 575
 Pro Ala Pro Gln Pro Gly Pro Gln Pro Pro Gln Pro Pro Gln Pro Gln
 580 585 590
 Pro Glu Ala Pro Ala Pro Gln Pro Pro Ala Gly Arg Glu Leu Ser Ala
 595 600 605
 Ala Ala Asn Ala Ala Val Asn Thr Gly Gly Val Gly Leu Ala Ser Thr
 610 615 620
 Leu Trp Tyr Ala Glu Ser Asn Ala Leu Ser Lys Arg Leu Gly Glu Leu
 625 630 635 640
 Arg Leu Asn Pro Asp Ala Gly Gly Ala Trp Gly Arg Gly Phe Ala Gln
 645 650 655
 Arg Gln Gln Leu Asp Asn Arg Ala Gly Arg Arg Phe Asp Gln Lys Val
 660 665 670
 Ala Gly Phe Glu Leu Gly Ala Asp His Ala Val Ala Val Ala Gly Gly
 675 680 685
 Arg Trp His Leu Gly Gly Leu Ala Gly Tyr Thr Arg Gly Asp Arg Gly
 690 695 700
 Phe Thr Gly Asp Gly Gly Gly His Thr Asp Ser Val His Val Gly Gly
 705 710 715 720
 Tyr Ala Thr Tyr Ile Ala Asp Ser Gly Phe Tyr Leu Asp Ala Thr Leu
 725 730 735
 Arg Ala Ser Arg Leu Glu Asn Asp Phe Lys Val Ala Gly Ser Asp Gly
 740 745 750
 Tyr Ala Val Lys Gly Lys Tyr Arg Thr His Gly Val Gly Ala Ser Leu
 755 760 765
 Glu Ala Gly Arg Arg Phe Thr His Ala Asp Gly Trp Phe Leu Glu Pro
 770 775 780
 Gln Ala Glu Leu Ala Val Phe Arg Ala Gly Gly Gly Ala Tyr Arg Ala
 785 790 795 800
 Ala Asn Gly Leu Arg Val Arg Asp Glu Gly Gly Ser Ser Val Leu Gly
 805 810 815

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Arg Leu Gly Leu Glu Val Gly Lys Arg Ile Glu Leu Ala Gly Gly Arg
820 825 830
Gln Val Gln Pro Tyr Ile Lys Ala Ser Val Leu Gln Glu Phe Asp Gly
835 840 845
Ala Gly Thr Val His Thr Asn Gly Ile Ala His Arg Thr Glu Leu Arg
850 855 860
Gly Thr Arg Ala Glu Leu Gly Leu Gly Met Ala Ala Ala Leu Gly Arg
865 870 875 880
Gly His Ser Leu Tyr Ala Ser Tyr Glu Tyr Ser Lys Gly Pro Lys Leu
885 890 895
Ala Met Pro Trp Thr Phe His Ala Gly Tyr Arg Tyr Ser Trp
900 905 910

<210> 6
<211> 922
<212> PRT
<213> Bordetella parapertussis

<400> 6
Met Asn Met Ser Leu Ser Arg Ile Val Lys Ala Ala Pro Leu Arg Arg
1 5 10 15
Thr Thr Leu Ala Met Ala Leu Gly Ala Leu Gly Ala Ala Pro Ala Ala
20 25 30
Tyr Ala Asp Trp Asn Asn Gln Ser Ile Ile Lys Ala Gly Glu Arg Gln
35 40 45
His Gly Ile His Ile Lys Gln Ser Asp Gly Ala Gly Val Arg Thr Ala
50 55 60
Thr Gly Thr Thr Ile Lys Val Ser Gly Arg Gln Ala Gln Gly Val Leu
65 70 75 80
Leu Glu Asn Pro Ala Ala Glu Leu Arg Phe Gln Asn Gly Ser Val Thr
85 90 95
Ser Ser Gly Gln Leu Phe Asp Glu Gly Val Arg Arg Phe Leu Gly Thr
100 105 110
Val Thr Val Lys Ala Gly Lys Leu Val Ala Asp His Ala Thr Leu Ala
115 120 125
Asn Val Ser Asp Thr Arg Asp Asp Asp Gly Ile Ala Leu Tyr Val Ala
130 135 140
Gly Glu Gln Ala Gln Ala Ser Ile Ala Asp Ser Thr Leu Gln Gly Ala
145 150 155 160
Gly Gly Val Arg Val Glu Arg Gly Ala Asn Val Thr Val Gln Arg Ser
165 170 175

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Thr	Ile	Val	Asp	Gly	Gly	Leu	His	Ile	Gly	Thr	Leu	Gln	Pro	Leu	Gln
			180					185					190		
Pro	Glu	Asp	Leu	Pro	Pro	Ser	Arg	Val	Val	Leu	Gly	Asp	Thr	Ser	Val
		195					200					205			
Thr	Ala	Val	Pro	Ala	Ser	Gly	Ala	Pro	Ala	Ala	Val	Phe	Val	Phe	Gly
	210					215					220				
Ala	Asn	Glu	Leu	Thr	Val	Asp	Gly	Gly	His	Ile	Thr	Gly	Gly	Arg	Ala
225					230					235					240
Ala	Gly	Val	Ala	Ala	Met	Asp	Gly	Ala	Ile	Val	His	Leu	Gln	Arg	Ala
				245					250					255	
Thr	Ile	Arg	Arg	Gly	Asp	Ala	Pro	Ala	Gly	Gly	Ala	Val	Pro	Gly	Gly
			260					265					270		
Ala	Val	Pro	Gly	Gly	Ala	Val	Pro	Gly	Gly	Phe	Gly	Pro	Leu	Leu	Asp
		275					280					285			
Gly	Trp	Tyr	Gly	Val	Asp	Val	Ser	Asp	Ser	Thr	Val	Asp	Leu	Ala	Gln
	290					295					300				
Ser	Ile	Val	Glu	Ala	Pro	Gln	Leu	Gly	Ala	Ala	Ile	Arg	Ala	Gly	Arg
305					310					315					320
Gly	Ala	Arg	Val	Thr	Val	Ser	Gly	Gly	Ser	Leu	Ser	Ala	Pro	His	Gly
				325					330					335	
Asn	Val	Ile	Glu	Thr	Gly	Gly	Gly	Ala	Arg	Arg	Phe	Pro	Pro	Pro	Ala
			340					345					350		
Ser	Pro	Leu	Ser	Ile	Thr	Leu	Gln	Ala	Gly	Ala	Arg	Ala	Gln	Gly	Arg
		355					360					365			
Ala	Leu	Leu	Tyr	Arg	Val	Leu	Pro	Glu	Pro	Val	Lys	Leu	Thr	Leu	Ala
	370					375					380				
Gly	Gly	Ala	Gln	Gly	Gln	Gly	Asp	Ile	Val	Ala	Thr	Glu	Leu	Pro	Pro
385					390					395					400
Ile	Pro	Gly	Ala	Ser	Ser	Gly	Pro	Leu	Asp	Val	Ala	Leu	Ala	Ser	Gln
				405					410					415	
Ala	Arg	Trp	Thr	Gly	Ala	Thr	Arg	Ala	Val	Asp	Ser	Leu	Ser	Ile	Asp
			420					425					430		
Asn	Ala	Thr	Trp	Val	Met	Thr	Asp	Asn	Ser	Asn	Val	Gly	Ala	Leu	Arg
		435					440					445			
Leu	Ala	Ser	Asp	Gly	Ser	Val	Asp	Phe	Gln	Gln	Pro	Ala	Glu	Ala	Gly
		450				455					460				
Arg	Phe	Lys	Val	Leu	Met	Val	Asp	Thr	Leu	Ala	Gly	Ser	Gly	Leu	Phe
465					470					475					480
Arg	Met	Asn	Val	Phe	Ala	Asp	Leu	Gly	Leu	Ser	Asp	Lys	Leu	Val	Val
				485					490					495	

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Met	Arg	Asp	Ala	Ser	Gly	Gln	His	Arg	Leu	Trp	Val	Arg	Asn	Ser	Gly	500	505	510
Ser	Glu	Pro	Ala	Ser	Gly	Asn	Thr	Met	Leu	Leu	Val	Gln	Thr	Pro	Arg	515	520	525
Gly	Ser	Ala	Ala	Thr	Phe	Thr	Leu	Ala	Asn	Lys	Asp	Gly	Lys	Val	Asp	530	535	540
Ile	Gly	Thr	Tyr	Arg	Tyr	Arg	Leu	Ala	Ala	Asn	Gly	Asn	Gly	Gln	Trp	545	550	555
Ser	Leu	Val	Gly	Ala	Lys	Ala	Pro	Pro	Ala	Pro	Lys	Pro	Ala	Pro	Gln	565	570	575
Pro	Gly	Pro	Gln	Pro	Gly	Pro	Gln	Pro	Pro	Gln	Pro	Pro	Gln	Pro	Pro	580	585	590
Gln	Pro	Pro	Gln	Pro	Pro	Gln	Pro	Pro	Gln	Arg	Gln	Pro	Glu	Ala	Pro	595	600	605
Ala	Pro	Gln	Pro	Pro	Ala	Gly	Arg	Glu	Leu	Ser	Ala	Ala	Ala	Asn	Ala	610	615	620
Ala	Val	Asn	Thr	Gly	Gly	Val	Gly	Leu	Ala	Ser	Thr	Leu	Trp	Tyr	Ala	625	630	635
Glu	Ser	Asn	Ala	Leu	Ser	Lys	Arg	Leu	Gly	Glu	Leu	Arg	Leu	Asn	Pro	645	650	655
Asp	Ala	Gly	Gly	Ala	Trp	Gly	Arg	Gly	Phe	Ala	Gln	Arg	Gln	Gln	Leu	660	665	670
Asp	Asn	Arg	Ala	Gly	Arg	Arg	Phe	Asp	Gln	Lys	Val	Ala	Gly	Phe	Glu	675	680	685
Leu	Gly	Ala	Asp	His	Ala	Val	Ala	Val	Ala	Gly	Gly	Arg	Trp	His	Leu	690	695	700
Gly	Gly	Leu	Ala	Gly	Tyr	Thr	Arg	Gly	Asp	Arg	Gly	Phe	Thr	Gly	Asp	705	710	715
Gly	Gly	Gly	His	Thr	Asp	Ser	Val	His	Val	Gly	Gly	Tyr	Ala	Thr	Tyr	725	730	735
Ile	Ala	Asn	Ser	Gly	Phe	Tyr	Leu	Asp	Ala	Thr	Leu	Arg	Ala	Ser	Arg	740	745	750
Leu	Glu	Asn	Asp	Phe	Lys	Val	Ala	Gly	Ser	Asp	Gly	Tyr	Ala	Val	Lys	755	760	765
Gly	Lys	Tyr	Arg	Thr	His	Gly	Val	Gly	Val	Ser	Leu	Glu	Ala	Gly	Arg	770	775	780
Arg	Phe	Ala	His	Ala	Asp	Gly	Trp	Phe	Leu	Glu	Pro	Gln	Ala	Glu	Leu	785	790	795
Ala	Val	Phe	Arg	Val	Gly	Gly	Gly	Ala	Tyr	Arg	Ala	Ala	Asn	Gly	Leu			

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805

810

815

Arg Val Arg Asp Glu Gly Gly Ser Ser Val Leu Gly Arg Leu Gly Leu
820 825 830
Glu Val Gly Lys Arg Ile Glu Leu Ala Gly Gly Arg Gln Val Gln Pro
835 840 845
Tyr Ile Lys Ala Ser Val Leu Gln Glu Phe Asp Gly Ala Gly Thr Val
850 855 860
Arg Thr Asn Gly Ile Ala His Arg Thr Glu Leu Arg Gly Thr Arg Ala
865 870 875 880
Glu Leu Gly Leu Gly Met Ala Ala Ala Leu Gly Arg Gly His Ser Leu
885 890 895
Tyr Ala Ser Tyr Glu Tyr Ser Lys Gly Pro Lys Leu Ala Met Pro Trp
900 905 910
Thr Phe His Ala Gly Tyr Arg Tyr Ser Trp
915 920

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<211> 51

<212> PRT

<213> Bordetella bronchiseptica

<400> 7

Gln Arg Ala Thr Ile Arg Arg Gly Asp Ala Pro Ala Gly Gly Ala Val
1 5 10 15
Pro Gly Gly Ala Val Pro Gly Gly Ala Val Pro Gly Gly Phe Gly Pro
20 25 30
Leu Leu Asp Gly Trp Tyr Gly Val Asp Val Ser Asp Ser Thr Val Asp
35 40 45
Leu Ala Gln
50

<210> 8

<211> 46

<212> PRT

<213> Bordetella bronchiseptica

<400> 8

Gln Arg Ala Thr Ile Arg Arg Gly Asp Ala Pro Ala Gly Gly Ala Val
1 5 10 15
Pro Gly Gly Ala Val Pro Gly Gly Phe Gly Pro Leu Leu Asp Gly Trp
20 25 30
Tyr Gly Val Asp Val Ser Asp Ser Thr Val Asp Leu Ala Gln
35 40 45

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<210> 9
<211> 56
<212> PRT
<213> Bordetella bronchiseptica

<400> 9
Gln Arg Ala Thr Ile Arg Arg Gly Asp Ala Pro Ala Gly Gly Gly Val
1 5 10 15
Pro Gly Gly Ala Val Pro Gly Gly Phe Asp Pro Gly Gly Phe Gly Pro
20 25 30
Gly Gly Phe Gly Pro Val Leu Asp Gly Trp Tyr Gly Val Asp Val Ser
35 40 45
Gly Ser Thr Val Glu Leu Ala Gln
50 55

<210> 10
<211> 56
<212> PRT
<213> Bordetella bronchiseptica

<400> 10
Gln Arg Ala Thr Ile Arg Arg Gly Asp Ala Pro Ala Gly Gly Ala Val
1 5 10 15
Pro Gly Gly Ala Val Pro Gly Gly Ala Val Pro Gly Gly Phe Gly Pro
20 25 30
Gly Gly Phe Gly Pro Val Leu Asp Gly Trp Tyr Gly Val Asp Val Ser
35 40 45
Gly Ser Ser Val Glu Leu Ala Gln
50 55

<210> 11
<211> 61
<212> PRT
<213> Bordetella bronchiseptica

<400> 11
Gln Arg Ala Thr Ile Arg Arg Gly Asp Ala Pro Ala Gly Gly Ala Val
1 5 10 15
Pro Gly Gly Ala Val Pro Gly Gly Phe Gly Pro Gly Gly Phe Gly Pro
20 25 30
Gly Gly Phe Gly Pro Gly Gly Phe Gly Pro Val Leu Asp Gly Trp Tyr
35 40 45
Gly Val Asp Val Ser Gly Ser Ser Val Glu Leu Ala Gln
50 55 60

<210> 12
<211> 56

03495206

<212> PRT

<213> Bordetella bronchiseptica

<400> 12

Gln Arg Ala Thr Ile Arg Arg Gly Asp Ala Pro Ala Gly Gly Ala Val
1 5 10 15

Pro Gly Gly Ala Val Pro Gly Gly Phe Gly Pro Gly Gly Phe Gly Pro
20 25 30

Gly Gly Phe Gly Pro Val Leu Asp Gly Trp Tyr Gly Val Asp Val Ser
35 40 45

Gly Ser Ser Val Glu Leu Ala Gln
50 55

<210> 13

<211> 51

<212> PRT

<213> Bordetella bronchiseptica

<400> 13

Gln Arg Ala Thr Ile Arg Arg Gly Asp Ala Pro Ala Gly Gly Ala Val
1 5 10 15

Pro Gly Gly Ala Val Pro Gly Gly Phe Gly Pro Gly Gly Phe Gly Pro
20 25 30

Val Leu Asp Gly Trp Tyr Gly Val Asp Val Ser Gly Ser Ser Val Glu
35 40 45

Leu Ala Gln
50

<210> 14

<211> 49

<212> PRT

<213> Bordetella bronchiseptica

<400> 14

Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro
1 5 10 15

Gln Pro Gly Pro Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Arg Gln
20 25 30

Pro Glu Ala Pro Ala Pro Gln Pro Pro Ala Gly Arg Glu Leu Ser Ala
35 40 45

Ala

<210> 15

<211> 52

<212> PRT

<213> Bordetella bronchiseptica

03495206

<400> 15

Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro
1 5 10 15

Gln Pro Gly Pro Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Pro Pro
20 25 30

Gln Arg Gln Pro Glu Ala Pro Ala Pro Gln Pro Pro Ala Gly Arg Glu
35 40 45

Leu Ser Ala Ala
50

<210> 16

<211> 59

<212> PRT

<213> Bordetella bronchiseptica

<400> 16

Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro
1 5 10 15

Gln Pro Gly Pro Gln Pro Gly Pro Gln Pro Gly Pro Gln Pro Pro Gln
20 25 30

Pro Pro Gln Pro Pro Gln Pro Pro Gln Arg Pro Glu Ala Pro Ala Pro
35 40 45

Gln Pro Pro Ala Gly Arg Glu Leu Ser Ala Ala
50 55

<210> 17

<211> 52

<212> PRT

<213> Bordetella bronchiseptica

<400> 17

Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro
1 5 10 15

Gln Pro Gly Pro Gln Pro Gly Pro Gln Pro Pro Gln Pro Pro Gln Pro
20 25 30

Pro Gln Arg Pro Glu Ala Pro Ala Pro Gln Pro Pro Ala Gly Arg Glu
35 40 45

Leu Ser Ala Ala
50

<210> 18

<211> 56

<212> PRT

<213> Bordetella bronchiseptica

<400> 18

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Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro
1 5 10 15
Gln Pro Gly Pro Gln Pro Gly Pro Gln Pro Pro Gln Pro Pro Gln Pro
20 25 30
Pro Gln Pro Pro Gln Arg Gln Pro Glu Ala Pro Ala Pro Gln Pro Pro
35 40 45
Ala Gly Arg Glu Leu Ser Ala Ala
50 55

<210> 19
<211> 58
<212> PRT
<213> Bordetella bronchiseptica

<400> 19
Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro
1 5 10 15
Gln Pro Gly Pro Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Pro Pro
20 25 30
Gln Pro Pro Gln Pro Pro Gln Arg Gln Pro Glu Ala Pro Ala Pro Gln
35 40 45
Pro Pro Ala Gly Arg Glu Leu Ser Ala Ala
50 55

<210> 20
<211> 48
<212> PRT
<213> Bordetella bronchiseptica

<400> 20
Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro
1 5 10 15
Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Arg Gln Pro
20 25 30
Glu Ala Pro Ala Pro Gln Pro Pro Ala Gly Arg Glu Leu Ser Ala Ala
35 40 45

<210> 21
<211> 52
<212> PRT
<213> Bordetella bronchiseptica

<400> 21
Gly Ala Lys Val Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro
1 5 10 15
Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Pro Gln Pro
20 25 30

03495206

Gln Pro Gln Pro Glu Ala Pro Ala Pro Gln Pro Pro Ala Gly Arg Glu
35 40 45

Leu Ser Ala Ala
50

<210> 22
<211> 54
<212> PRT
<213> Bordetella bronchiseptica

<400> 22
Gly Ala Lys Val Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro
1 5 10 15

Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Pro Gln Pro
20 25 30

Gln Pro Gln Pro Gln Pro Glu Ala Pro Ala Pro Gln Pro Pro Ala Gly
35 40 45

Arg Glu Leu Ser Ala Ala
50

<210> 23
<211> 42
<212> PRT
<213> Bordetella bronchiseptica

<400> 23
Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro
1 5 10 15

Gln Pro Pro Gln Pro Pro Gln Pro Gln Pro Glu Ala Pro Ala Pro Gln
20 25 30

Pro Pro Ala Gly Arg Glu Leu Ser Ala Ala
35 40

<210> 24
<211> 39
<212> PRT
<213> Bordetella bronchiseptica

<400> 24
Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro
1 5 10 15

Gln Pro Pro Gln Pro Gln Pro Glu Ala Pro Ala Pro Gln Pro Pro Ala
20 25 30

Gly Arg Glu Leu Ser Ala Ala
35

<210> 25

03495206

<211> 5

<212> PRT

<213> Artificial

<220>

<221> MISC_FEATURE

<222> (3)..(4)

<223> Xaa can be any amino acid

<400> 25

Gly Gly Xaa Xaa Pro
1 5